The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

IN THE MATTER OF THE GAS RESOURCES PRESERVATION ACT

AND IN THE MATTER of a Joint Hearing to determine various questions relating to the proposed Export of Natural Gas from the Province of Alberta.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session: November 14th, 1951.

Volume 20.

I N D E X

VOLUME 20.

14 November 1951.

W I T N E S S E S

E X H I B I T S

VOLUME 20.

November 14th, 1951.

THE CHAIRMAN: All right, Mr. Porter.

MR. PORTER: I will call Mr. Waterfield.

FLOYD EDWARD WATERFIELD, recalled, testified as follows:-

THE CHAIRMAN: Does anybody wish to question Mr. Waterfield?

MR. MARTLAND: I have some, sir.

CROSS-EXAMINATION BY MR. MARTLAND:

Q Mr. Waterfield, you told us yesterday that the estimated plant account was $253,000,000.00 U.S. funds?

A That is right, sir.

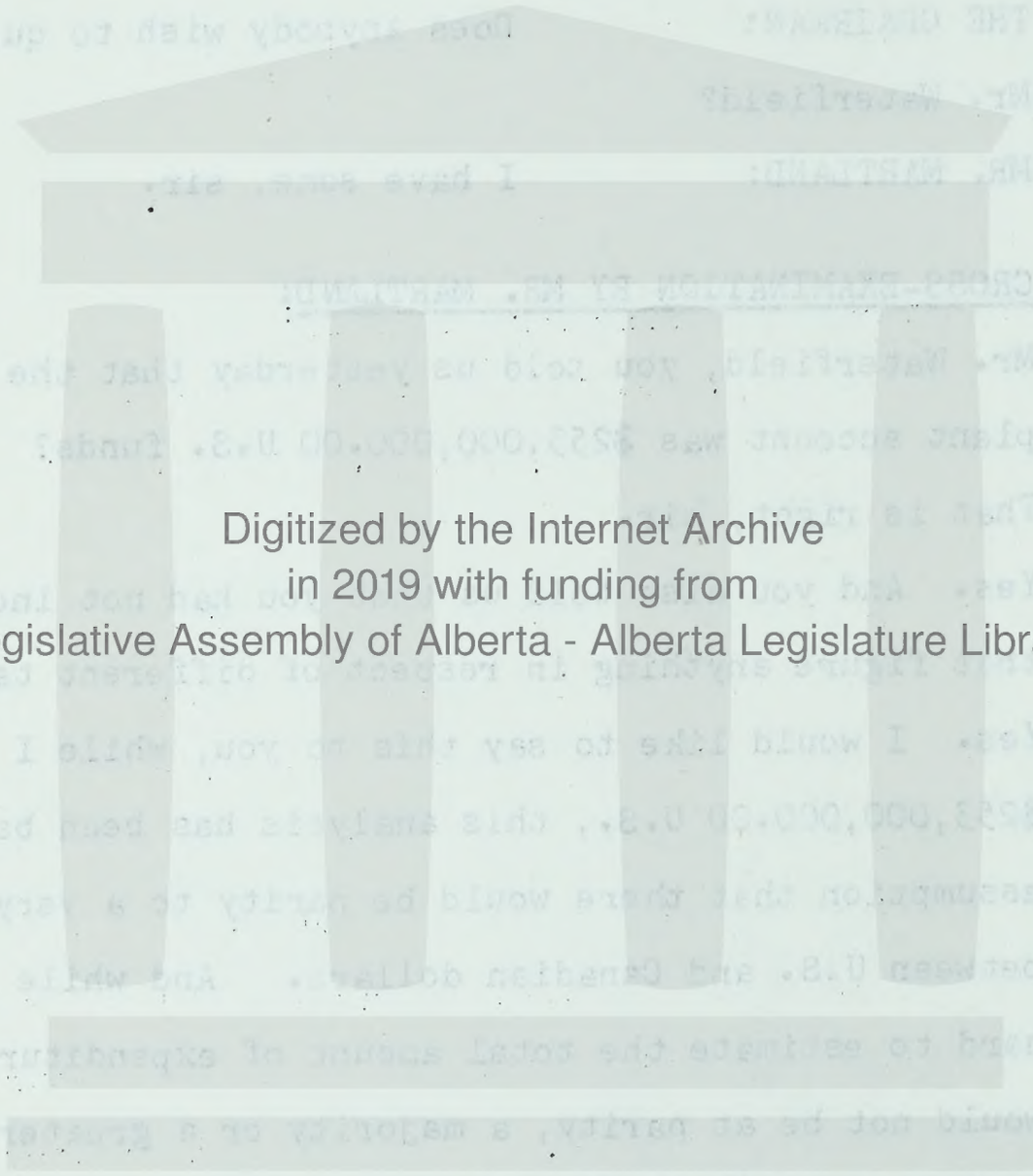
Q Yes. And you also told us that you had not included in that figure anything in respect of different taxes?

A Yes. I would like to say this to you, while I say $253,000,000.00 U.S., this analysis has been based on the assumption that there would be parity to a very great extent between U.S. and Canadian dollars. And while it is rather hard to estimate the total amount of expenditures which would not be at parity, a majority or a greater per cent, perhaps as much as 80 per cent, would all be in Canadian dollars.

Q Yes?

A So that I hope I did not mislead you when I said U.S. dollars.

Q No, no, I just wanted to get the picture clear. If we wanted to determine the estimated capital cost of the project today we would have to make some computations with regard to sales tax and like matters?



A Yes.

Q Now, there was some reference yesterday to a pipe mill. Is that the same one that you referred to in Edmonton in May when you talked about wishful thinking, Mr. Waterfield?

A My remark yesterday, I believe, sir, was prefaced by "If someone did this", that that would be the answer to the tariff question.

Q But you do recall giving evidence in May?

A That is right, sir.

Q And saying that it might be a matter of wishful thinking, is that right?

A That is right.

Q You have not been engaged on any study yourself as to the cost of constructing a pipe mill?

A No, sir.

Q Now, if you would not mind turning to the exhibit you presented, exhibit 55?

A I beg your pardon?

Q Exhibit 55?

A Yes, sir.

Q I would like to refer first of all to that first page which is after the tab "Gathering System". In the second last paragraph you say,

> "Most of the topography along the presently proposed traverse does not present any unusual or extreme construction problems with the exception of the larger rivers, swamp, muskeg and marsh areas."

and you are there dealing, of course, with the gathering system in the Province of Alberta?

A Yes, sir.

Q And I take it when you use the words "unusual or extreme construction problems" with reference to the gathering system, there is an indication that so far as the transmission line is concerned that you do face those unusual and extreme construction problems?

A I would not say that that necessarily follows. There are degrees of difficulty, and in the main transmission system there are some sections of it which are difficult.

Q Extremely difficult?

A I would say they are very, very difficult, yes, but not insurmountable.

Q Yes. I was going to come to that in a moment, Mr. Waterfield. With regard to the last paragraph on that same page,

> "Consideration must be given to the construction period and if it should occur during severe cold or wet seasons, the presently predicted costs would be materially increased."

That statement would apply equally well to the transmission system, wouldn't it?

A It would apply to any construction.

Q I see. And do you expect a very lengthy season for the construction of the transmission line where you would not be faced with severe cold and severe wet conditions, Mr. Waterfield?

A Well, from a review of your weather reports which are made at the time of trying to get some feel of the inter-provincial line, we studied weather records back some 25 years.

F. E. Waterfield,
Cr. Ex. by Mr. Martland.

Q That was with reference to where, Mr. Waterfield?

A That was with reference to Alberta and Saskatchewan.

Q Yes?

A And the same thing applies to the other provinces.

Q Yes?

A And while there are some extreme conditions that have been recorded it seems reasonable to conclude that there are as much as 180 working days normally in the year's time. Now, there are certain sections of the country, I am informed, where only about two months out of the twelve where certain types of construction are prohibitive during or due to weather conditions.

Q Would you expect 180 working days for those portions of northern Ontario, Mr. Waterfield?

A Normally, yes.

Q That is your considered opinion with regard to that, is it?

A That is what the records reveal.

Q For northern Ontario?

A For northern Ontario?

Q Yes?

A I beg your pardon. For northern Ontario certain classes of work, I am told, such as clearing and logging operations are carried out almost throughout the entire year.

Q What about pipe line construction apart from that?

A I would normally expect that you could get through the route that is proposed for this line 180 working days where a pipe line could be laid.

Q How long do you expect that it will take to lay that section of the line?

A That can be answered only by qualification to the extent of the number of spreads of equipment which are placed on the job. And if a two year programme, for example, was set forth, then there would have to be enough spreads of equipment to keep the progress of the work in step with the expected schedule.

Q Would it be your intention to carry on construction right through the year or only during those portions when the weather conditions were more favourable?

A Largely I think it would go through the year.

Q So that in that event this statement of material increase would apply to at least part of the construction?

A The material increase would come about in this manner, if the owner desires a construction project to proceed in abnormal weather, then he must be prepared to pay an additional cost which might be incurred.

Q Do you want to give us any idea of what you mean by "material increase", did you have any percentage in mind?

A No, no, sir. It was merely an indication that if construction is pushed through the most adverse weather where we all know that the efficiency of men and equipment is slowed down, it costs you more.

Q I see. Now, if you would turn now to the diagramatic sketch of the gathering system, I just wanted to ask you one question with regard to that?

A Yes, sir.

Q Is it proposed that this gathering system is going to draw gas from all of those 34 fields?

A That is the present information which I have received.

Q That is the present intention, so far as you know?

A Yes, sir.

Q Now, if you will pass on to the main line, I just want to ask you, first of all, so that I have the position clearly, as I understood your evidence yesterday you said that aerial reconnaissance had been made, and I also understood that observation had been made by car over some parts of the route. Which portions did you cover by car?

A I personally have not covered any by car. Mine has been entirely by aerial reconnaissance.

Q That is as far as your personal contact is concerned?

A Yes.

Q Yes, but your staff, Mr. Waterfield, how much would have been covered by car, having regard to your staff?

A It would be rather hard to give you a definite figure, but one gentleman from Canadian Delhi spent about 3 weeks driving in Ontario, and one of the representatives of the Oklahoma Contracting Company spent some two or maybe three weeks at intervals driving over the sections along the total mileage, or, I mean, with regard to the total mileage which they drove, I do not have those figures.

Q There would be certainly portions of this proposed pipe line route that have not been travelled over at all except by air?

A Because there are no roads.

Q No, and there has not been any attempt made to walk them?

A No, sir.

Q Now, then, let us take a look at section 2 of the main line, and in the second paragraph you say, "This is one of the

three most difficult construction sections", and I wonder if you could tell me which are the other two?

A The sections around Kenora, of which this is one, and the one around Sudbury.

Q What number would they be?

A If you would just turn back, Mr. Martland. The section that you speak of from Gunne Station, not from Gunne Station, but from Kenora to Gunne Station, or section 2. Now, from Nipigon to Mobert, which is section 5. . .

Q Yes?

A . . . and from Mobert to a point near Sudbury, those are the three sections which are referred to, which would be 3, 5 and 6.

Q And section 2 you include as well?

A No, not 3, sections 2, 5 and 6.

Q MR. C. E. SMITH: Number 7 costs $45,000.00 a mile. I thought maybe we could figure it out that way.

A I beg your pardon?

Q Number 7 is not included and it costs pretty high, $45,000.00?

A There are some other factors which brought that cost up, it is the congestion there that exists rather than the actual physical development.

Q MR. MARTLAND: Now, as I understood you yesterday, Mr. Waterfield, you have taken it section by section and you have compared your problem with the problems in common in some other country and from experiences of your own?

A That is right, sir, so far as it is possible to do, and make comparisons on the average.

Q Yes. You have not indicated just which pipe lines you are comparing it with, it is just your broad general experience?

A That is right, sir.

Q Now, on page 1683 of your evidence yesterday you were asked this question:

> "Q. So far as you know, you do not meet on this line, then, any conditions that have not been met elsewhere?"

And the answer was, "Nor do we meet conditions which are insurmountable." That answer, I take it, would apply to the whole of the route?

A I beg your pardon?

Q Your answer there relates to the whole of the route?

A The entire project, yes.

Q I would also take it that you are indicating by that answer that there are some sections of this line which are extremely tough to handle, and all you can say is that like problems have been met somewhere else on some occasion?

A I think that is true, yes, sir.

Q In other words, it can be done physically but it is going to cost plenty of money in some of these sections?

A It can be done physically and it can be done at a reasonable cost for those physical conditions.

Q At a reasonable cost related to the type of physical conditions you are running into?

A Yes.

Q Because you remember using the word "fantastic" with reference to costs when you were giving evidence in Edmonton, Mr. Waterfield?

F. E. Waterfield,
Cr. Ex. by Mr. Martland.

A Doubtless some of these costs might appear fantastic to those who had notexperience with this type of construction.

Q I take it when you were in Edmonton that they appeared fantastic to you or you would not have used the term?

A That was not the intention. The intention was to comment that they may appear fantastic to anyone not familiar with pipe line construction.

(Go to page 1703.)

Q To anyone who is only familiar with normal pipeline construction conditions, would that be fair?

A That would follow.

Q By the way, when you used that term, "fantastic", it related, as I recall it, to Section 5 of the route, and that is still the same Section 5 that appears in the present exhibit?

A Yes.

Q Now, again turning back to Section 2 of the main line, second paragraph, there are many lakes which can not be crossed at a reasonable cost except in a few cases, and I am not quite clear as to just what you mean by that, Mr. Waterfield?

A If you were to take a great traverse you would intersect lakes which would be rather wide and it would be impractical from the standpoint of good construction to attempt to cross those lakes when it is possible to detour and go around them or to cross them at some narrow neck.

Q I see. So that you are indicating there that a direct route is impossible in certain sections because of the existence of lakes which would be unreasonable to cross?

A I would not say it is impossible but it is impractical to do it in that manner.

Q And that is the position in so far as this section is concerned with respect to many lakes?

A Your route would be very irregular in order to miss so far as possible all of those topographic features which would mean incurring high construction costs if you endeavour to go straight across them.

Q And then you have about 85 per cent of the line on this section traversing rock and granite?

A Sections.

Q What does that involve in respect to the laying of the pipe-line, Mr. Waterfield? Just tell us what you have to do when you are laying line over those rock and granite sections.

A Normally, your ditches would be dug and your pipe buried but it is more difficult and more expensive to dig a ditch through rock than it is through common earth or soil or clay or gravel.

Q What would you do, blast it out?

A The only way I know of that you can remove rock is by blasting.

Q And there would have to be a good deal of that done on this section of the line as well as through the others?

A Undoubtedly there would be quite extensive rock excavation but it does not necessarily follow it would be solid rock excavation from top to bottom of the ditch or for the entire depth of the pipe.

Q And your estimate as to cost on this particular section runs you to about $100,000 a mile on the total?

A The construction?

Q Yes?

A The construction is estimated at $48,000 per mile.

Q I am thinking of your grand total for everything there, Mr. Waterfield, on Section 2 on the page following your text there.

A The total construction for Section 2, including everything,

is $96,769.00 per mile average.

Q Well, close to $100,000. Now, if you will turn to Section 3, and I will only refer to it briefly, but there is a statement in the second paragraph there, the last sentence:

"Rock excavation will be required for about 40 per cent of the traverse and the remaining excavation can be classed as normal."

Does that mean for about 40 per cent of the 226 miles?

A That is the estimate, yes.

Q Then in Section 4, the rock conditions there, as I understand it, are encountered for about 60 per cent of that distance of 63.4 miles?

A That is right.

Q And we come to Section 5, and I would gather from your text there that this is the toughest section of them all, is it?

A Well, it is rather hard to say this is the toughest section unless you have a similar one to compare it with.

Q You do not think there are others that offer a basis for comparison?

A Well, no others that present the same terrain and topography as this one.

Q From this there are 85 to 95 per cent of the 85 miles which are going to require rock excavation?

A Yes.

MR. PORTER: What page is that?

A It is on page 10 of Section 5.

Q MR. MARTLAND: And this offers some problems with varying elevations, Mr. Waterfield?

A Yes. You are perhaps familiar with the rather short

breaking terrain that is encountered through these mountains where they come down to the lake front.

Q Then I was going to ask you with regard to Section 6. You have flown over that portion, Mr. Waterfield?

A Yes, about four times.

Q My information is that there are rises and falls of from five to six hundred feet and that you might encounter about five or six of those within a distance of a mile?

A In this Section 6?

Q Do you agree with that?

A Not exactly, no, sir, because your breaking escarpments are not as sharp as they are in Section 5. You hit some irregular sections for a short distance but you would expect to try to avoid those as far as possible.

Q Is there a lot of muskeg in there?

A There is quite a bit in places.

Q Is it deep?

A Well, I have not walked into it, sir. I am advised by those who have walked through the section that much of the muskeg in the swamp can be skirted.

Q Has somebody actually walked through that section that you know of?

A I believe that they have, because Section 6, its location is influenced to a very great extent by the projected route for the Trans-Canada highway from White River down to Sudbury.

Q I notice on the map which is attached to that section that there is a branch railway line from Hawk Junction. The route of that little branch line is a pretty irregular

looking route, isn't it, Mr. Waterfield?

A Are you talking about 6-A?

Q 6-A, I am sorry.

A That was from Hawk Junction where?

Q There is a little branch line appears off to the west. Well, I may be wrong in my directions, to the left and then down towards the bottom of the map.

A In plan it is irregular.

Q Yes, it gives some indication of the difficulties of the country, doesn't it?

A This section through here, Section 6, of which we are now speaking, has probably undergone as much controversial discussion as to a location as any, and perhaps more than any of it, and consideration has been given to more nearly following the railroad. It presented certain difficulties but there is a compromise in the route as it is presently projected and as it would be finally located.

Q I won't go through section by section because we have now covered those which you have indicated as being the most difficult. I wanted to ask you about an answer that you gave yesterday to my friend, Mr. Smith, as to pipe costs, $121.00 a ton. Can you tell us for what quantity that price was applicable?

A I do not believe that I am permitted to divulge that because that is professional as far as I am concerned and I was asked if I knew the price and I happened to know that.

Q Are you in a position to tell us what kind of pipe it was, as to size and quality?

A 20-inch X52.

Q And what quality?

A X52.

Q Now, in your computation of freight costs in your tables, Mr. Waterfield, you computed those from where? Do you have some common origin?

A Yes, the Corporation House Limited of Ottawa was asked to prepare freight rate schedules using the Soo as a basing point.

Q And that is the basis on which these have been made up?

A These rates shown here are those which were given to us by the Corporation House.

Q Now, if we can just turn briefly to the back of your exhibit and I am looking now under the tab "Pressure Stations" and at page 4. You arrived there at a unit cost of $215.00 per horsepower?

A Yes.

Q Do you not think that that is rather a low estimate, Mr. Waterfield?

A It does not seem to be so when you get quotations from vendors of the equipment and price them out accordingly.

Q By the way, would you have to take into account duty and sales tax with regard to those units?

A That is right, if they were imported.

Q They would be, wouldn't they?

A I do not know, sir.

Q I see. I have in mind on another exhibit which is not yet filed, Prairie Pipe Lines, there is an estimate of $250.00 per horsepower. Do you think that is excessive?

F. E. Waterfield,
Cr. Ex. by Mr. Martland.
Cr. Ex. by Mr. S.B. Smith.

A I do not know exactly what is included in the $250.00 per horsepower or what standards or class of construction the person who made the estimate had in mind. I am not prepared to say whether it is high or low.

Q Now, if you will turn to the next following page after that where you commence another subject, that of main line capacity. At the bottom of the page I want to see if I understand you correctly that the capacity of this proposed pipeline will only permit the delivery in Moose Jaw of 1.8 million cubic feet per day?

A More gas than that could be delivered to Moose Jaw but that is the estimate and the amount which was forecast to be taken off at Moose Jaw.

Q It was the estimate given to you for the purpose of making your determination as to your pipeline, is that right?

A Yes, sir.

Q And only 3.6 million per day for Regina?

A That was the figure that was forecast to be required for Regina.

Q Now, the following page, only 16 million for Winnipeg, at the foot of the page?

A Yes, sir.

Q Thank you.

CROSS-EXAMINATION BY MR. S.B. SMITH:

Q Mr. Waterfield, I suppose you have heard about the difficulties of construction of the transcontinental railways in Canada and that their construction was assisted by subsidies, land grants and Government guarantees and that

kind of thing. Are you familiar with it?

A I am not familiar with the background of the assistance which they received.

Q Canadian transcontinental railways have built through the territory which you plan on building through and which you have been considering in this report? They were built through the same territory, you know that?

A Oh, certainly.

Q Now, you roughly follow from Winnipeg to Sudbury, not exactly but approximately, the route of the transcontinental railways, don't you?

A Is that the Canadian Pacific of which you are speaking?

Q I am asking you, it is a fact that you follow the route approximately of a transcontinental railway?

A If you are speaking of the Canadian Pacific.

Q Well, I am asking you.

A Well, I am not sure that I understand what you mean by "transcontinental railway".

Q Well, let us say that all the railways running east and west in that area are transcontinental.

A It follows partly the Canadian Pacific and partly the Canadian National.

Q It follows partly the Canadian Pacific and partly the Canadian National. What part follows the Canadian National?

A Well, Sections 2, 3; 4 follows both.

Q Section 2. Take a look at Section 2. On page 4 you say:

> "Beginning at a point approximately 60 miles west of Kenora this section extends to Gunne Station on the C.N.R."

Is that correct?

A No, sir. I knew that some sharp-eyed person would detect that typographical mistake and I trusted you would correct it.

Q You are not near the Canadian National railway there, are you?

A No. That is purely a typographical mistake.

MR. C.E. SMITH: I told your counsel about it before we sat.

MR. PORTER: I thought somebody else would do it.

Q MR. S.B. SMITH: Section 3, also you talk about the C.N.R.?

A The same thing, it is a typographical mistake.

Q Have you travelled over those railways yourself?

A Yes, I have been across those railways.

Q In making this survey?

A No, sir.

Q How long since you have travelled over them?

A In 1950. In March 1950.

MR. PORTER: You did not notice much change, did you?

Q MR. S.B. SMITH: Have you travelled across Canada on both the Canadian National and the Canadian Pacific?

A Not on both of them, no, sir.

Q Which one did you travel on?

A Canadian Pacific.

Q Thank you. By the way, did you write these sections up,

Section 2 and Section 3, yourself?

A Yes, sir.

Q MR. C.E. SMITH: Maybe I can help you. You want Sections 2, 3 and 4 corrected to substitute C.P.R. for C.N.R.?

A Sections 2 and 3. Section 4 follows both of them, sir. Section 4 can be regarded as correct because it follows both of the railroads. In fact, in lies in between them in certain portions of the route.

Q MR. S.B. SMITH: With regard to Sections 2 and 3, your text will be corrected to read?

A C.P.R. instead of C.N.R.

Q With regard to your section in Alberta, Mr. Waterfield, and looking at the sketch S-2, I think it is described as, it would appear to me as if your line more or less runs almost directly from field to field. That is practically speaking, correct, isn't it, more or less in a straight line?

A Except for those deviations which are necessary to miss lakes and other topographic features.

Q With respect to what you call "deviations", was any consideration given to the possibility or probability of serving communities in Alberta, like small towns, villages, hamlets, and so on, in the location of your line?

A Not directly. Where it was possible to bring it, other things being equal, and it could skirt the outlying sections of a town, why, consideration was given to that but not primarily.

Q When you say other things being equal, have you reference to cost or what?

A The length of line.

Q Will you give me an illustration?

A Pardon?

Q Will you give me an illustration, Mr. Waterfield. . .

A Yes.

Q . . . which would give us that idea? It would mean additional costs because of the length?

A Yes.

Q Give me some example where you had your line and ran it close to some community, can you give me something off-hand?

A Not offhand. I would have to go to the original layout to do it, because I do not know the names, and I do not have the names of the different communities in my mind.

Q The only thing, you look at the S-2, and then at some of the subsequent maps, I wondered whether it might not be possible for your main gathering line to go close to some communities in any event, and give service to them eventually?

A Well, it would be, if I might answer you, more economical to lay a smaller line from the larger diameter line than it would to extend the larger diameter line and increase its length.

Q You mean it would be more economical to run what I would call a stub line?

A A short lateral or stub line.

Q And has that been considered by you at all in laying your main line?

A On the gathering system?

Q Yes?

A Primarily no, sir.

Q Primarily no?

A Yes.

Q Just one other question. On your main transmission line through Saskatchewan, if I understand this correctly, the two places you have in contemplation for service are Moose Jaw and Regina?

A Yes.

Q Those are the two mentioned?

A Yes.

Q Now, are such places as Swift Current, Qu'Appelle, Indian Head, Moosomin and Broadview, places like that, have they been considered when you were locating your main line through that Province, for instance?

A Not as far as I was concerned in the location of the line. Now, they are within a sufficiently close distance to lay lateral lines from the main line to them.

Q Consideration was purely that there might be lateral lines to various places of that nature?

A Yes, sir.

Q And really the same answer applies that you gave with regard to your gathering system in Alberta, is that correct?

A That is correct, sir.

Q All right.

.....

CROSS-EXAMINATION BY MR. NOLAN:

Q In answering Mr Martland, Mr. Waterfield, you spoke about the amount of gas that would be dropped off at Moose Jaw and Regina?

A Yes, sir.

Q I do not know what page that is on your Exhibit 55, but taking it from memory I think it was 1.8 million cubic feet per day for Moose Jaw?

A Yes, sir.

Q It is in this main line capacity data towards the end of the report?

A Yes, sir.

Q You know, Mr.Waterfield, that there has been,and is now going on, a very large exploratory program in the Province of Saskatchewan?

A I am not aware of what you are speaking.

Q Well, they are looking for oil and gas in Saskatchewan.

A I see.

Q Didn't you know that?

A There is some development, I understand, yes, sir.

Q And you know that they have got some gas in Saskatchewan now?

A No, not familiar with that.

Q Do you know whether either the communities of Regina or Moose Jaw have expressed a willingness to take gas from your line?

A May I clarify for you this one point in answering your question? The quantities of gas which are predicated here were furnished to me by a market survey as being those quantities which might be withdrawn by those com-

munities at this time. I did not provide those figures and my assignment was one of locating the route and of designing the system to meet those load conditions.

Q I know, but it all presupposes the willingness of Regina and Moose Jaw to take the gas from your line, doesn't it?

A I would presume it presupposes that willingness.

Q Do you know whether they have expressed such a willingness?

A Certainly I do not.

Q Thank you.

.....

CROSS-EXAMINATION BY MR.MILVAIN:

Q Mr. Waterfield, I am looking at Exhibit 55, and in the part that is marked "General" at page 2, you haveyour first statement which is the Estimated Plant Account, and the first item shown on it is "Intangible Plant $600,000.00." I do not know what an intangible plant is, could you tell us?

A I suppose it might be considered to cover the exploration work or any other items which are in a deferred account. Now, I am no accountant, please understand me, I am no accountant. You cannot capitalize them, but you certainly have to have some funds to carry on some work, such as reconnaissance surveys, field studies, and the rest of it, and that becomes intangible until such time as your plant is in existence, and then you can put it in the right pigeonhole, as I understand it.

Q I was interested in knowing what the components of that might be, whether it would be pieces of machinery that you were going to bring in, or what they were.

MR. C. E. SMITH: Maybe it includes the possibility of a permit.

MR. MILVAIN: That is one of the things that daily becomes more tangible.

Q Then, too, there is another item on that statement that I don't understand. You say you are an engineer, I am only a lawyer, and I am not an accountant either. There is an item "Interest during Construction $10,200,000.00". Just what is that?

A An accountant prepared that figure, sir. It was based upon the forecast of Canadian Delhi as to their probable manner of financing, and I did not prepare the figure, that was furnished to me.

Q I see. So that, again, is a figure that you, as an engineer, have accepted from somebody else?

A That is right.

Q And then there is one other item also in that statement of taxes during construction, $1,000,000.00, do you know what that is, Mr. Waterfield?

A Again that is an estimate, I am told, which was prepared and again it is by the accountants, as to the probable amount of ad valorem taxes that might be assessed against property during this period of construction before it goes into operation.

Q I see. And have you any information as to the various components that go to make them up? That is a general figure that you have?

A It is just a general figure. We know from experience that your taxes on the average of physical plants will run anywhere from three-quarters to one and a half per cent.

Q I see. Now, then, dealing still with this statement under the various items headed "Mains", and we take one of these, for instance, the 30-inch main line, which has a total of $139,518,500.00. What are the components that go to make that up? I suppose there would be pipe, construction, and a variety of things?

A The things which enter into that are the summary of sections 1 through to 10.

Q 1 to 10?

A 1 through 10.

Q It is the total of 30-inch pipe to the extent of that many miles, and it takes and summarizes the line pipe, freight, coating materials, regular and special contract construction, and it excludes the land and rights-of-way because they are included in the caption "Lands and Right-of-way" figure above.

Q I see?

A And that gives a total of $139,518,500.00. It also includes the line gates.

Q I see. So that if I want to follow this thing properly, you would go to the heading under "Main and Lateral System"?

A That is right, sir.

Q And at page 1 there is a Table of figures?

A Yes.

Q And the second line from the bottom,"Total Main Line", shows 470,922 tons of steel?

A Are you reading from Section 1?

Q Page 1, under the heading "Main and Lateral System".

A Oh, I am sorry. Now, what was your figure of tonnage again on page 1?

Q On Page 1 of the statement you have got a little tab marked "Main and Lateral System"?

A I see where you are reading now.

Q You see those figures?

A Yes.

Q And in the second last line there is a total there "Total Main Line" of estimated length, 1,803.2 miles, and 470,922 tons of steel?

A Yes, sir.

Q So that would be one of the items, one of the component items that go to make up this $139,518,500.00 appearing in the estimated plant account?

A Yes.

Q The large component would be the cost of the pipe?

A That is right, sir.

Q And I notice that in most of your Tables throughout here you seem to be dealing with pipe at the basis of $125.00 per ton?

A Yes.

Q So that the component in that particular item of main line would be 470,922 times 125?

A For the total amount of pipe.

Q For the total amount of pipe?

A Yes.

Q Or a total of some $58,865,250.00, if my multiplication is right.

A And if you add your freight to that it would come to over $70,000,000.00.

Q Yes. What I am thinking of, Mr.Waterfield, is this, that in this main line item or total of over $139,000,000.00,

there is approximately $59,000,000.00, which is the price of pipe?

A Yes, sir.

Q So far as you know, all of that pipe would have to be imported into Canada?

A I am hardly prepared to say that all of it would be, or all of it would not be, but if it were left entirely to the ability of pipe mills in Canada to produce 30-inch pipe, then it would have to come from some place else besides Canada at the present time.

Q At the present time there is nowhere where you could look to find that amount of pipe made in Canada?

A I do not believe it is made, the type of pipe that we are talking about here.

Q No. So that it is fair to say that that pipe would be imported into Canada in all likelihood?

A Yes.

Q And it would carry a Custom duty?

A Sir?

Q It would carry a Custom duty?

A I believe duty is assessed against it.

Q And whatever that Custom duty is would have to be added to your total price of $253,000,000.00?

A If it were paid, yes.

Q If it were paid?

A Yes, sir.

Q Have you ever discovered a method of getting away from paying these taxes, because if you have, I would like to have your views on that.

MR.PORTER: That my friend's political party

understands very well. I am surprised at his lack of comprehension.

MR.MILVAIN: We now hear from a lawyer rather than an engineer.

MR. C. E. SMITH: From a politician, having regard to the last part of his statement.

Q MR.MILVAIN: And this same process of reasoning that you and I have been applying to this 30-inch main line pipe would also apply to all of the rest of the pipe involved in your costs?

A No, I would not say that that is entirely true, because you have mills in Canada capable of making the 16-inch pipe.

Q And then, insofar as the mills in Canada are concerned, this purchase would be subject to whatever inside taxes Canada might impose on such a transaction?

A Yes,sir.

Q Sales and excise taxes?

A Yes.

Q And I am wondering if you ever found any method of beating that, any method of beating those taxes?

A No, as long as I told the truth I did not.

Q And my friend, Mr. Martland, while he was cross-examining you, mentioned compressor stations?

A Yes.

Q The equipment involved in those compressor stations would also be imported, I take it?

A I am not too familiar with all of your, with the ability of your manufacturing plants in Canada to make compressor station equipment of this size, but I am told that it

would be difficult for them to do because they have not done it, and there would certainly have to be a period of experience in adapting compressors of this type to their manufacturing facilities.

Q So that in all likelihood, again, that equipment would be imported?

A It probably would. Now, there are compressors made in England, as I understand it, which are comparable to compressors made in the United States.

Q But, again, if imported, they would be subject to such Custom tariff duties as they might have?

A I do not know whether Canada assesses a Customs duty against England or not.

Q I say, Mr.Waterfield, if they were imported they would be subject to such duties as might apply?

A That is correct.

Q And, again, those duties would increase your end price of $253,000,000.00?

A Again, if they were paid, yes, sir.

Q And as you increase that end price of $253,000,000.00, you increase the return that is desired from the operation of the system?

A If other figures remained constant, yes sir.

Q And as you increase the return that is desired from the system, you either increase the cost of your gas to your consumer, or you have to sell a lot more gas?

A Or you have to effect economies offsetting it in other directions.

Q Yes? But experience tells us that that increase is usually met in an increased cost of gas to the consumer?

A I beg your pardon?

Q I say experience tells us that that increased demand for recovery of cost will bring about an increase in cost to the consumer, that is the way that the additional amount is recovered?

A Well, were you making that as a statement or asking me a question?

Q Is that so in your experience?

A Well, as your plant account goes up, unless there are offsetting economies in other directions, your cost of return, of course, goes up.

Q Now, then, to deal with this pipe expense, Mr.Waterfield, in addition to the cost of the pipe as a steel, it is wrapped and treated?

A That is correct.

Q That is another part of the cost?

A Yes, sir.

Q And are other materials used in connection with that which would require to be imported, Mr. Waterfield?

A All of the materials which are used in the corrosion protection of the steel are available in Canada from Canadian manufacturers.

Q So they would be subject only to such sales and excise taxes as the Canadian authorities might impose?

A Yes.

Q And those taxes have not been taken into consideration in arriving at those costs?

A No, sir.

Q And did you ever make any estimate as to what the taxes might be, Mr. Waterfield?

A I am not sufficiently conversant with Canadian tax laws or tax rates to make any estimate.

Q I see. Did you make any inquiries as to what the Customs duties might be on steel?

A I have heard comments, but I do not know that they are official or correct.

Q Are you in a position to give us any information on that at all?

A I have heard figures which vary from 12½% to 24%.

Q As a duty on imported steel?

A Yes, sir. I think it depends somewhat on the class and kind of steel.

Q Now, until you know definitely where your pipe is coming from, is it possible for you to estimate accurately the ultimate cost of your line?

A I think you can approximate it in this manner: All of the physical or durable goods which are represented in this estimate should not exceed $125,000,000.00, and that is the maximum to which any excise or import duties could be applied. Now, if you can fix the percentages, then you can get a feel of what the items might be?

Q Yes?

A It would probably come closer to $110,000,000.00 than it would come to the $125,000,000.00, but those are the ranges.

Q But whatever that figure may be, it would be increased by the percentage of taxes that applied to that amount,

A That is right, sir.

Q So that if it were a total of 100 million dollars and the tax was the lowest figure that you have, 12½, you would have 12½ million dollars added to it?

A Yes.

Q And if it were the top bracket of 24, it would be 24 million?

A That is right.

Q And of course the ultimate cost of the line will play an important factor in fixing the price of gas at the end of that line?

A And it is only at the end of the job that you can tell what that figure is.

Q That is right, but cost is certainly an important factor to take into consideration in arriving at the price of gas?

A Yes.

Q Have you ever given any consideration, Mr. Waterfield, as to how long it would take to complete this line?

A I believe I answered that question a moment ago by saying that if a two-year programme were established then that is when you would try to complete it in.

Q And assuming that the necessary export permits were given, how quickly would you be able to get under way, do you know?

A Do you mean with the actual construction work or the work incident to actual construction? If the actual permits were given you could begin yesterday.

Q You are in a position where you could commence operations immediately?

A Yesterday.

Q Well, that is faster than immediately. And as to the actual

job of ditching and laying pipe, how long would it take you?

A Depending altogether on the number of crews which were brought in, the availability of equipment and materials and so forth, but it would be rather suddenly. It does not take a contractor very long to move once he gets the green light.

Q Would the number of spreads of equipment that you have have any bearing on the end price of your whole line?

A I have no spreads of equipment.

Q I say would the number being used have any bearing on the end cost of your line?

A Not necessarily. It is a production line basis anyway.

Q What does that mean?

A The more equipment you get the quicker it gets through.

Q Now, I would like you to turn for a moment, Mr. Waterfield, to that sketch map S-2. Now, if I am right, and I think I was careful about it, there are a total of 36 fields shown on that map and adding the total of the figures that are in the brackets, they come to 380?

A That is right, sir.

Q Now you in your text refer to taking gas from 34 fields.

THE CHAIRMAN: Gentlemen, I wonder if we could have a little quietness. It is hard to hear the examination which is going on here with the other talking.

Q MR. MILVAIN: Your text shows that you intend to take gas from 34 fields whereas there are 36 fields shown on this plan?

A Yes, sir.

Q Which of the two do you intend not to take gas from, do you know?

A It depends altogether on the nomenclature, what you call a field and what you do not. There are some overlapping names. Now, the figures which are represented here are the figures which were used in sizing of the lines. The 380 million exceeds the 365, it indicates that as a design factor.

Q Well, then, I take it, Mr. Waterfield, the plan is to use all of the fields that are shown on S-2?

A That is right.

Q Regardless of whether they total 36 or 38?

A That is right.

Q And that it is this total of 380 million cubic feet per day as the capacity of those fields that is borne in mind throughout your whole scheme?

A That is right, sir.

Q Now tell me, is that figure 380 million the peak capacity of the fields in question?

A No, sir.

Q Well, just what does that figure represent?

A The 380 million?

Q Yes?

A It represents the withdrawal on a daily average or a peak day for the initial design of the main transmission system.

Q Does that mean to say that when you get to the point where you are withdrawing from this combination of fields a total of 380 million per day that then your line will be operating at top capacity?

A At top capacity without the addition then of additional booster stations.

Q But in order to handle the 280 million you will use the first set of, I think it is, 13 compressors?

A Yes, sir. 280 or 380?

Q 380. Did I say 2? I meant 3. We will make a typographical correction too. But it is planned that the system will be working at its peak capacity in handling that 380 million cubic feet per day?

A It will be working at its peak capacity when handling 365 million feet per day. 380 is the total withdrawal. Now, how that will be distributed among these fields in the exact quantities is beyond my scope of saying right at this time, but there is a possible total withdrawal rate of 380 from those fields to satisfy a main line load rate at maximum of 365.

Q So that the situation then is that your line itself will be working at its peak capacity when it handles 365?

A That is right, sir.

Q Million cubic feet per day?

A That is right.

Q And that in order to increase it above that amount it would require the addition of further compressor stations?

A That is right.

Q And the cost of those additional pressure stations is not included in the $253,000,000.00?

A No, sir.

Q Do you know approximately what the cost of the additional compressor stations that will be required might be?

A It is presently estimated around 31 million.

Q And then your line would be up to a total capacity of some

515?

A 515 net delivery.

Q Million cubic feet per day. And is that the absolute peak capacity of the line when reached?

A Net deliverable, yes, sir.

Q So that if you wanted to handle more gas than that you would then require more line?

A Either loop your line or add additional booster stations.

Q Would additional compression stations increase the capacity?

A Not to economically justify it, I do not think.

Q It would require looping or additional lines?

A Yes.

Q Now, when is it anticipated, assuming you get into operation, that you would be supplying gas to the extent of your peak capacity of 365 million cubic feet per day?

A If the consumer matches the rate at which it is possible to construct the line, he should be receiving gas within two to three years.

Q That is within two to three years of the time of commencing building the line, or two or three years after completion?

A From the time of the beginning of building the line the most extreme customer should have gas at the end of three years. The closest customer will of course have it much sooner.

Q So that on the basis of your present estimate, then, Mr. Waterfield, approximately three years from the time that construction of the line was commenced, that line would then be operating at its peak capacity of 365 million cubic

feet per day?

A If the customers required that quantity.

Q Well, from your customer survey does it indicate you would have customers to that extent?

A I am drawing now upon the survey which has been made by others but it seems reasonable to conclude that within a five year period the rate of 365 might be equalled.

MR. PORTER: Perhaps I should explain for Mr. Milvain's benefit, and I think for Mr. Waterhouse's too, that there is a market survey which Mr. Shaddock will present, and it is on the figures contained in that on which Mr. Waterhouse has done his work.

MR. C. E. SMITH: Waterfield, isn't it, not Waterhouse?

THE WITNESS: That is right.

MR. PORTER: I am sorry, I keep on making that error and I apologise.

Q MR. MILVAIN: Now, still looking at this map S-2, the gathering system in Alberta appears to fall into two main parts. There is a long tree that runs from Princess up north and a shorter one that extends from Princess out to Pincher Creek. That appears to be a fair division. I say, assume, Mr. Waterfield, as an engineer, that that Pincher Creek leg were eliminated, that you cannot get any gas from Pincher Creek, what have you to say about the feasibility of the rest of your system?

A I hardly feel that I am prepared to answer that question because my assignment involved taking the information which was furnished and designing a pipe line system to fit it. Now, if those conditions changed, I would be glad to take

it under consideration and design another system.

Q Well, the practical result would be this, would it not, if you add up the total of 36 fields shown on this map, they come to 380 million cubic feet per day. That includes 128 million from Pincher Creek field.

A Yes, sir.

Q So that half . . .

MR. C. E. SMITH: 128?

MR. MILVAIN: 128.

MR. C. E. SMITH: Oh, yes, correct.

Q MR. MILVAIN: And if that were eliminated something over a third, in the neighbourhood of a third, of your total is gone. That is the sum total of it, isn't it?

A You are assuming it is gone?

Q Yes?

A That is correct, your figures are right.

Q And if you are building a system that contemplates handling 365 million within three to five years, it would be a very serious blow to that system to lose 128 million cubic feet per day of its anticipated supply, wouldn't it?

A I have no advice that that is lost.

Q Oh, no. I say assume that it is, it would be a serious blow to the system?

A Assuming none came it would be a serious blow.

Q Yes, and would it then leave the rest of your system in a position where it was a feasible operation?

A I would think so, and presuming again and assuming that the difference was made up from higher rates of withdrawal from the existing fields or new fields supplementing the one that

came out of the picture.

Q Well, the answer to it would be, would it not, the necessity of finding additional reserves?

A Or higher rates of withdrawal from those that are known at the present time.

Q Does engineering indicate that those fields would stand that additional withdrawal?

A May I tell you, sir, I am no geologist. I merely take the figures given me by the geologists and use them accordingly.

Q I was wondering whether or not your geologist gave you that information?

A He did not. He gave only the opinion you see in front of you.

Q You tell me that your geologists have not given you information which would indicate the feasibility of building the line?

A I beg your pardon?

Q Your geologists have not given you the information from which you could conclude the feasibility of building this line if the one source of Pincher Creek were eliminated?

A I do not recall that ever being a consideration.

Q Probably you can tell me this, though, Mr.Waterfield, as an engineer, if that source of supply were eliminated it would have the effect of materially increasing the cost of gas at the other end of your system?

A If that quantity of gas were removed along with another quantity down to the zero point, the cost would rise proportionately. Whether it comes from the Pincher Creek field or whether it comes from any other field, the picture

would be exactly the same.

Q And if you followed the suggestion you made to me a moment ago of increasing the rate of withdrawal from the remaining fields, would you expect a rapid decrease of pressure in those fields?

A I again repeat to you, sir, I am no geologist and I do not feel I am qualified to answer that question.

Q I see. I am just checking my own notes, Mr. Waterfield. Mr. Martland seems to have covered many of the grounds I had made notes on. I am looking, Mr. Waterfield, at page 1 under the tab "Gathering System" and the last sentence in the first paragraph says this, "The system can be expanded to a capacity of 570 MMCFD by a slight increase in field pressures and the construction of a second booster station at Hanna." Not being an engineer, I am wondering how you increase the field pressures?

A By field booster stations.

Q That is to say, the installation of a pumping station right at the field?

A If they are there and if the well head pressures initially exceed those that are stated here, and there are residual or reserve pressures available, then you would draw on them to that extent.

Q So that by that increase in field pressure you gain an increase in the pressure at which the gas is delivered from the field rather than an increase in the field itself?

A The pressure may be there initially and you only use a portion of it and the balance is there for you when you wish it.

Q That is natural pressure within the field?

A Yes, sir.

Q But if that natural pressure within the field had got to a point where it could not satisfy your requirements, then you would have to pump it?

A Yes.

Q That would increase your expense?

A To whatever extent that might be necessary.

Q And still under the general heading that deals with gathering systems, at page 7 you deal with future extensions of the Peace River areaand the table of expense which appears at page 8 shows a total of $17,907,500.00, which I take to be the estimated total cost of installing the extension to Peace River?

A For the facilities required to handle 150 million feet a day.

Q Yes, and that close to $18,000,000.00 is not included in your figure of $253,000,000.00 that we started off with?

A No, sir.

Q So that we might say this, that if you cannot get the necessary increment beyond the 380 million shown in your map S-2 in order to serve additional customers or additional requirements, you would then have to go into this Peace River extension or some other extension to find the required supply?

A If the development had not been localized.

Q And then too I suppose an important element you would have to consider in making the extension is whether gas in those other areas was still available for you to get when you got there?

A I presume you would have to take all factors into consideration.

Q If some of those other people then get some, it would perhaps change your plans?

MR. C. E. SMITH: They would want to know that before they started, I hope.

Q MR. MILVAIN: Now if, Mr. Waterfield, it became necessary to extend your field, your gathering system, in order to obtain additional supplies, would that have the effect of adding to the cost of gas to your consumers?

A If the first investment had been made and it was necessary to make additional investment, it might or might not, depending on the load which was involved at that time.

Q Now in that part of your submission which deals with compressor stations, I see again in the last sentence of the first paragraph this statement, "A daily input of 365 MMCFD will be required at Station (1), Princess, Alberta, to meet the initial net sales and allow for 16.8 MMCFD compressor station fuel and 2.6 MMCFD system loss."

MR. C. E. SMITH: Where is that?

MR. MILVAIN: That is on page 1 of Main Line Compressor Stations. It is the first page under the tab "Compressor Stations", Mr. Smith.

Q If I understand that properly, it will require 16.8 million Mcf per day to operate the 13 initial compressor stations?

A It means that you would utilize your 16.8 million feet per day to operate all of your compressor stations.

Q And then you say in the last paragraph on that page,

"Future expansion to handle the ultimate net sales

"capacity of 515 MMCFD will require the construction of 12 10,000 horsepower intermediate stations on the 30-inch main line."

Those 12 additional stations, I suppose, would also consume fuel?

A Yes, sir.

Q On the same basis as the initial 13?

A Not necessarily so.

Q I am wondering by what figure that 16.8 per day would have to be increased?

A It would depend entirely upon the type of units which were installed.

Q Have you any idea as to what that would be?

A If the same type of units were installed, then you could take perhaps the same rate of fuel consumption.

Q So that if they were the same you would add 12/13ths of 16.8?

A Not necessarily follow in that manner, but you can calculate it on a horsepower basis.

Q Now tell me this, was the installation of the 13 original compressor stations based upon an estimate of sales or sales requirements?

A Is that your question?

Q Yes?

A Were the 13 stations based on it?

Q Yes?

A They become a part of the sales and the point at which those sales will drop off.

Q But in other words, if I might put it this way, by using

your 13 initial stations you have acapacity of supplying 365 million cubic feet per day?

A 346 net, yes.

Q Which includes that part which is being used for fuel and lost in the line, which leaves 346 for your customers?

A That is right.

Q Now, when you instal the system that would supply 346 million to your customers, did you then have in mind a a sales survey that would require that delivery?

A I did not get the last.

Q I see. Did you have in mind a sales survey that told you there would be that requirement for sale?

A Yes, I had figures supplied which would indicate a consumption by points along this proposed route.

Q And that total consumption would be reached within the period you told me before of probably three years?

A It might be in five years.

Q I am wondering what your sales survey told you that made you consider the additional twelve. That would raise it to 507?

A 507 what,sir?

Q Million feet per day. No, 515, I beg your pardon.

A I could not get your 507.

Q I beg your pardon, Mr. Waterfield, the figure is 515.

A The 515, sir, provides for the future. Let us say, for the purposes of illustration, with a pipe line system it is prudent and wise to so initially design your system for its final condition, which ultimately might be reached or may never be reached, and install only those facilities which

are economically desirable at the time your system is constructed, and so that when the time comes to add the additional future facility it can be done economically and expeditiously.

(Go to page 1739.)

Q You leave some latitude at the top?

A Certainly.

Q But the amount of latitude you are going to leave at the top must be dictated by some factor?

A It is dictated by the ultimate that the system if capable of doing.

Q And the ultimate that your system is capable of doing must be dictated by the ultimate that you can reasonably anticipate in the way of sales?

A Things that are equal to the same thing become equal to each other.

Q Now, I do not think that you have still answered my question, Mr. Waterfield? I would like to know whether or not you did have sales surveys made that would indicate that you would get anywhere near a customer demand requiring 515,000,000 cubic feet per day?

A I have no survey that would indicate 515,

Q I am no engineer, but it seems this simple to me, Mr. Waterfield, that if you have a sales survey that would indicate that the very peak you could have or could ever hope to supply, would be, to take a figure of 400,000,000, it would not be economic to build a line that would be capable of supplying 515,000,000, would it?

A It has been the history of the growth of gas pipe lines, as well as of other pipe lines, that no one of them has ever been able to judge the maximum capacity that might be available for future sales, and you certainly would not wish to restrict your line to that which at the moment might be economically feasible.

Q Well, on that basis why didn't you make this a total or a line capable of supplying 1000 million?

A I beg your pardon?

Q Why didn't you make this capable of supplying 1,000 million rather than 515?

A Those figures are getting rather astronomical, of course, and your initial design of your facilities must be such that when it is installed, it can economically meet your foreseeable load, and then if the future develops, or of it never develops, you are still on economically sound ground.

Q From which I take it, Mr. Waterfield, that your foreseeable load approaches 515 million in some realistic fashion?

A It is presumed that it could reach that point, but we have to first, do we not, sir, establish some break-even, shall we call it, load, and above that all factors are incremental, and below that it cannot pay its way.

Q Did you have any facts in mind from which you could conclude a time within which this peak capacity of 515 million might be reached?

A I have no conception of when that might occur.

Q You have no information that would lead you to that conclusion?

A No, sir.

Q THE CHAIRMAN: Mr. Milvain, I think we must adjourn for a few minutes.

MR.MILVAIN: Yes, sir.

(Hearing resumed after short adjournment).

Q MR.MILVAIN: Just a couple of more questions, Mr. Waterfield. I wonder if you would mind looking at a map which is the first one under "Main and Lateral System", and you will notice when you get down to Sudbury there appears to be short spurs going off in a southwesterly direction?

A Yes, sir.

Q What is that?

A Forgive the draftsman, please, sir.

Q I beg your pardon?

A Forgive the draftsman, please, sir.

Q Pardon?

A That is a slip of the pen.

Q I see. So that it does not mean anything?

A No.

Q Very good. Now, Mr. Waterfield, have you ever given any consideration to the possible use of gas from the Pakowki Lake area after the expiration of the 5-year permit if the gas becomes available?

A From what, did you say?

Q Pakowki Lake?

A Where is that?

Q That is in Southern Alberta, down between Pincher Creek and Medicine Hat.

Q I am dealing only with those facts which were given to me as the basis upon which to design a gathering and transmission system, and if those are real, then the transmission system and the gathering system,as contained herein, will perform in the manner in which it says it will.

Q From which I take it that you have not given consideration

to the possible use of Pakowki Lake gas if the 5-year permit is not renewed at the end of the 5-year period?

A For clarity, I might again repeat that I am only dealing with those figures of gas in the fields which are presented here.

Q And it is only the places shown in S-2?

A Yes, that is what I was asked to do and that is what was done.

Q Very good, sir, thank you very much.

.....

CROSS-EXAMINATION BY MR. NOLAN:

Q I was wondering, Mr.Waterfield, before you leave, would you tell me with respect to the gathering system what the cost is per inch-mile?

A I do not have that figure worked out, sir, but I can give you some averages, but not per inch-mile because I am not accustomed to dealing in inch-miles.

Q That is a big task, is it, to obtain that figure?

A By inch-mile you mean the diameter of line times the number of miles involved in that?

Q Yes?

A And the total of those figures?

Q Yes?

A It is only a matter of calculation. If you would like to have it I would be glad to have it done for you.

Q Well, if you would be good enough, I would be very much obliged.

MR. PORTER: For an appropriate fee.

A For a consideration.

THE CHAIRMAN: Mr. McDonald, have you anything?

MR. McDONALD: No, I have no questions, thank you, sir.

.....

EXAMINATION BY DR. GOVIER:

Q Mr. Waterfield, I think I understand your position with respect to the 34 or 36 fields that you have dealt with, but I would judt like to make sure. Am I to understand that Mr.Trostel will be available and able to answer questions as to whether gas is available in the amounts required and at the performance required from the fields that this gathering system contemplates?

A That is my understanding, sir.

Q And he also will be able to tell us whether or not the various gathering lines are economical, having regard to the amount of reserve, the daily capacity and the distance involved?

A Well, I would be unable to say how far he has gone in that connection.

Q But, in any case, you cannot go any distance in that connection, is that right?

A No, because the composite is dealt with here, and the economics of the components have not been investigated by me.

Q There is one thing that seems strange to me, Mr. Waterfield, and just to take as an example, one of those distant fields is Boyle, and I do not quite know how anyone would arrive or would decide to tie that field in without having first made at least a preliminary design of a line and obtained a preliminary cost. Now, I take it from that that Mr. Trostel,

possibly,from his experience, just said "Well, as far as I can see, Boyle is all right", is that your understanding?

A That, perhaps, might have been it, because it was not within my province to question the quantities of withdrawal, but merely to lay out the line which would handle that volume, along with the balance of the system.

Q Well, Mr. Trostel can answer those questions, can he, Mr. Porter?

MR. PORTER: Mr. Trostel will be here to give us the picture of the availability and the deliverability and, of course, will say what he has said before, that we have to start somewhere to get a conception of a program, and that this is tentative and subject to change as discoveries and experience dictates. Mr. Trostel will give us the supply position. Mr. Waterfield was asked to design a line on the premise that the supply was there. This is a mechanical job unrelated to the question of supply.

Q DR. GOVIER: Perhaps the two can be related, Mr. Waterfield? I recall Mr. Trostel's previous reluctance to discuss economics with regard to the various fields, partly on the grounds that he had not designed the line, so that you see my difficulty.

THE CHAIRMAN: Mr. Porter, will Mr. Waterfield be available here when Mr.Trostel is here, so that these matters can be cleaned up?

MR. PORTER: Well, he will be made available. Mr. Trostel will be quite a while, and I do not know whether Mr. Waterfield should be kept here all of that period, but

certainly if anything arises out of Mr. Trostel's testimony, which requires Mr. Waterfield's presence, we will produce him.

Q DR. GOVIER: Mr. Waterfield, I notice that you refer on page 1 of your gathering system to the assumption that the gas will be moisture and sulphur free?

A Yes.

Q I take it from that that there have been no estimates included for any dehydration equipment at all?

A Not in this report, sir.

Q And also I take it that there have been no estimates included for any field compression as such?

A As such, no.

Q Although down the line such equipment would be required?

A There is one gathering system compressor, but that is for transmission through the gathering system.

Q Yes?

A But at the point of origin in the field your statement is correct.

Q Do you think, Mr. Waterfield, it is realistic to completely omit field compression when it may be required in some fields within a short period of years, or do you assume that the owner of the field will provide that?

A That is the assumption, that the well head pressure will be there, but he will provide the compression facilities necessary for the system.

Q I see. I wonder, Mr.Waterfield, if you will look in the last section of your report under the tab "Compressor Stations"?

A Yes, sir.

Q Referring first to page 1, I would just like to clarify that all of the capacity figures quoted here, namely, the 346 million per day, the 515 million, and the 365 million, all of those refer to peak-day capacities, is that correct?

A Yes, sir.

Q And you have nowhere in this report given consideration to the daily average, because that is not involved in pipe line design, is that right?

A No, sir, it is a load factor problem.

Q I think once or twice you used the expression "average" and it was a little misleading, but those are all peak days?

A Those are all peak days, yes, sir.

Q Mr. Waterfield, will you turn to pages 10 and 11, in this same section?

A Yes, sir.

Q Where you present and discuss the flow formula?

A Yes, sir.

Q Can you tell me for what flowing temperature the line was designed?

A 60°.

Q And what depth of cover are you planning on, Mr. Waterfield?

A A minimum of 30 inches.

Q Do you know whether the 60° flowing temperature and that depth of cover are consistent with the Canadian climate?

A From work which was done at the McGill University, and which was done apart from any connection with pipe lines, but there was a very excellent treatise done there, and that gentleman who did the work gave us temperature varia-

tions and different depths in the soils, and that was used by me in the inter-Provincial line in calculating the depth of cover, and that was used as a guide here as what might be reasonably expected. It is not expected that the 60° will maintain throughout the year, because we know that there are certain of our soil temperatures at depths of 5 feet reach temperatures of 30°, and we had thought of having something lower than 60°, probably in the neighbourhood of 40, but to average the calculation out we thought that probably 60° would be quite anple in the matter of presenting the basic design data, so that it was left at 60°.

Q Did you take into account the fact with regard to the days when you required the complete capacity of the line, namely, on cold winter days?

A Yes.

Q That is, some time that the gas might be quite cool?

A Yes. It is recognized that it would be possibly something lower than the 365, and that again explains, perhaps, my terminology in using "average", and it might be one way or the other, so that it might be reasonably close somewhere to 365.

Q I notice that you corrected it by .62 specific gravity. Where did you get that figure, Mr. Waterfield?

A .62?

Q Yes?

A That is just what our best information led us to believe it might be confronted with in the way of specific gravity. There is no exact composite enalysis to prove it is ,61 or .62.

Q You feel quite sure it would be close to .62?

A I think it would be, sir.

Q Mr. Waterfield, I notice that the Panhandle formula does not include any specific provision for the compressibility of gas?

A No, sir.

Q Is that factor taken into account implicitly in some of the others, it is, and is it omitted in this formula?

A It is omitted in this, and it can be taken into account if it is considered sufficiently important.

Q What is your own opinion? Should provision be made for compressibility correction or not?

A Well, I do not want to seem to be indecisive, but I am somewhat on the fence. I have seen some very good arguments for and some very good arguments against, and I do not have any firm opinion regarding it.

Q In any case, you can cover up the matter a little bit in your deficiency factor?

A You can if you want to. That is purely a judgment factor, of course.

Q What about elevation changes, Mr. Waterfield, you do not seem to have taken them into account? Do you think they are important at all?

A In this country I do not think the elevation changes, I do not think they are of such magnitude that I would feel it would make any appreciable difference. I think you have some other factors that are greater unknowns than the effect of elevation changes.

Q I suppose the worst that could happen would be that it would unbalance a few of the compressor stations?

A It could do that.

Q But you do not think it is of importance?

A I do not think it is of sufficient importance to give it the full weight that it would obtain in other locations.

Q Will you look at the bottom of page 12, Mr. Waterfield. . .

A Yes, sir.

Q . . . which is in the same section?

A Yes, sir.

Q I notice you say that the station spacing has been revised after preliminary calculation to utilize the fully rated capacity of the standard-sized units?

A Yes.

Q That is the meaning of this last paragraph, is it not?

A Yes.

Q And yet when I look at page 2 in the same section, I notice that you have two horsepower figures, the one labelled "Required" and the other labelled "Installed"?

A Yes.

Q Would you explain those, please?

A Well, those figures are figures of your actual requirement against, for example, the Station 3, 7500 horsepower installed, that gave us what we felt was the best particular design for that one station, although it actually required 5546, but to go into their fractional units would have produced a higher cost than that.

Q I appreciate that, but I thought the meaning of this paragraph 1 on page 12 was to the effect that in that Station No. 3, for example, what you do is to use the 7500 to spread the distance between Station 1 and Station 3, so that you completely use the 7500?

A If it were possible to compare it on the final analysis, that is what would be done. Those stations would be adjusted to utilize the maximum available horsepower within these sections.

Q Oh, I see. I guess I have misinterpreted the paragraph on page 12. It means that in the final design, when the line was being actually built, but you have not done it now?

A No, we have not done it now. No.

Q I see. Would you say, Mr.Waterfield, that this is a tight design, or a fairly liberal design for the capacity required? I am thinking of the 346 delivery peak-day capacity?

A I would say it is reasonable, it is not too loose nor too tight. It has allowed some latitude and some flexibility.

Q Would you look at the tabulation starting on page 5?

A Yes, sir.

Q One of the columns is labelled "Equivalent Volume Million Cubic Feet per Day". Is that the volume that you set on the slide rule?

A Yes, that is the limits of your rule for the 22-inch. You are working equivalents.

Q I see. I wonder, Mr.Waterfield, if you would mind commenting just briefly on the charts that follow drawing S-1, the horsepower curve and the flow charts?

A Yes, sir.

Q Will you just comment briefly on them?

A I beg your pardon?

Q Will you just comment briefly on those charts?

A Those were just introduced for general information, so

that we could refer back, if we wished, to make our changes in the matter of our brake-horsepower charts for our various compression ratios, and to make those horsepowers applicable to the particular requirements. They are more informative than that they are directly related to specific calculations contained herein.

Q Well, do they reflect the same factors that you have reported in your calculation?

A Yes, sir.

Q And this first chart, Chart No. C-1, with regard to that chart, what compressor and engine efficiency is reflected by this chart, or what over-all efficiency?

A I do not remember right now, sir. I do not have those working figures in front of me.

Q But these figures, in any case, would be consistent with what a manufacturer would actually recommend, is that right?

A Yes, sir, they were based on manufacturers' recommendations, and from quotations which were received for the type of units under consideration. I am sorry I cannot give you the figures now, but I just do not recall them.

Q Is the chart drawn for, say, level operation?

A It is drawn for 14.735, or sea level conditions of 14.4.

Q Was there any chart made for variations with regard to the compressor stations that you may have at sea level?

A No, sir.

Q Would you comment on the following charts, Mr. Waterfield?

A That first one is a flow chart for 30-inch pipe with regard to your station spacing.

Q Yes?

A The conditions were designed in testing for the drop in or drop out of your take-out points for these various station spacings, having regard to the various flow ratios to find that station spacing which would produce the most economical horsepower result.

Q Did you go right through an economical balance and assume for the entire line?

A We have made three or four of those at the present time, what we think is the best, based upon the scaled lengths, and I understand no surveys of distance have been made, and this appears to be the best.

(Go to page 1753)

Q Well, this chart is the composite then of the pipeline flow formula for various conditions, is that right?

A Yes.

Q Perhaps you would highlight the drawings numbered D-1, D-2, D-3, D-4 and D-5, Mr. Waterfield, just briefly, please.

A They represent just a typical plan schematic of one of the arrangements which we thought might be employed to the best advantage in Canadian conditions in Canadian construction, and it is very conventional in its form in that all of the units and all of the equipment are units with respect to the compressor station units so that in the event of difficulty with one unit your entire compressor station would not be down because of an interlocked system, and that is the basic thing that sketch D-1 attempts to set out. It is purely diagrammatic and illustrative.

The same would apply to the pressure flow diagram contained in D-2, merely indicates the customary or normal equipment used in compressor station design and its flow into, through and out of the compressor station.

Number D-3 is merely a cross-section of D-2 illustrative of the cooling system of the compressor with its individual unit piping into a common suction and discharge head.

D-4 is a plan arrangement typical only of two of a number of units which might be required in a station. That could be extended as many times as there are units necessary.

D-5 is a very conventional arrangement for a scraper trap at the pumping stations or, for that matter,

it could be at an intermediate point if so desired.

Q You had planned to use a scraper trap at each pressure station?

A Yes, but the same general plan could be employed at intermediate points if it were found necessary.

Q Could you refer me, Mr. Waterfield, to the place -- oh, here it is, it is page 4 in this same section. On pages 3 and 4 you go through the estimated total costs for a typical compressor station, and it is the final unit cost figure that I was interested in. I think you were questioned on this earlier this morning, Mr. Waterfield?

A Yes.

Q I am just a little disturbed because I have noticed in one of the briefs, which have not yet been submitted, that a figure of over $300.00 per brake horsepower is employed. While I recognize that your figure does not include taxes and may be low on that account, it did seem there was a very large spread and I want to find out which figure is more reasonable.

A Is it for the same horsepower, sir?

Q For the same range, I think. They may be slightly smaller.

A If they are smaller then your cost would go up, other things being comparable. And I am wondering, also, if your $300.00 figure includes things which are not included here, such as the engineering that goes into this compressor station and the inspection for the construction of those stations and similar items, because they are omitted in this $215.00 figure and are included elsewhere in the estimates.

Q I see. So there would be taxes, duty and so on, engineering and inspection that are not included in your figure?

A That is right, sir.

Q Are there any other things that someone else might have included that you have not?

A The location might have something to do with it, the matter of freight required.

Q Do you include freight?

A Yes, sir.

Q Oh, yes. Well, location would have a good deal to do with it, really, wouldn't it?

A Yes, sir. And in that connection I would like to point out to you that if you take the number of stations contained in this typical pressure station cost and multiply it by 13 figure comes up to $20,246,000. The reason for that, there was an attempt on our part to adjust the long and the short haul freight in preparing this tabulation given on page 2 and 3 and 4 represent a typical station.

Q Rather than an average one?

A That is right.

Q How would you get the most important items of cost in this breakdown, Mr. Waterfield? Would you get them by quotation, is that what you do?

A Yes, your largest items of cost are represented by your compressor station and auxiliary equipment and quotations for that equipment were obtained.

Q And they are recent quotations, as far as you could tell, and they should be applicable here?

A I think they should be because they were obtained within

the past three months.

Q I just had one other general question, Mr. Waterfield, and that was related to the total cost of this pipeline system in its total capacity. I understand that you have had considerable experience with other long distance transmission lines and that you are familiar with costs elsewhere. Can you tell me whether the capital cost of this line per unit of peak day capacity is comparable with that in other long distance transmission lines with which you have had experience?

A To the best that we have been able to check from the data available through the F.B.C. it compares rather favourably.

Q Would it be higher or lower or just generally of the same order of magnitude?

A It is about the same order of magnitude. It is hard to get a direct comparison because the conditions are not the same when you start comparing a system like Trans-Continental with one across Canada, but if you allow and use your best judgment it compares very favourably.

Q As far as you are concerned and from your part in this over-all study, you see no reason why this should not be an economic venture?

A I can find none, sir. It seems to me to be very reasonable and very fair. Certainly no effort has been made to do anything other than to produce reasonable and true results.

Q Thank you.

THE CHAIRMAN: Mr. Porter, possibly I should address this question to you. Do you intend before the close of this Hearing to give us a definite

Statement by Mr. Porter.

statement as to the estimatedcost of the line, that is, as to whether or not the taxes have to be added, whether the pipe is going to be manufactured in Canada, so that we would know just what a reasonable estimated cost would be for the line?

MR. PORTER: Well, I can explain our position in that. Negotiations have been undertaken for the construction of a mill to make this pipe in Canada, which may come tax free from England or can be brought under a small tax from the United States. If that occurs, the major item is free of tax. And another advantage accrues from that, because it changes the whole freight picture, because you are moving plate long distances and pipe the short distances, assuming your mill is placed on the lakes. Now, other considerations of a like nature made it impossible to calculate the tax element unless we did the unfair thing of assuming that the entire enterprise was going to be imported. Now, even assuming a substantial amount is imported, subject to all the taxes conceivable, the great part of the money that would be spent on this line is going to be spent in Canada.

Let me illustrate. You have got rights-of-way, you have got buildings, you have got wages, you have got freight and other transportation, all payable in Canadian money. Now, those things avoid entirely the tariff problem.

On the question of exchange you have also two elements, one, we are borrowing money in the United States, as will appear from the financial aspect of this matter,

in American dollars and some in Canada. We are going to be paying for a lot of these things in Canadian dollars, so that the exchange element will not hinge in that aspect of it.

Now, if you say, Mr. Chairman, that you want us to say by a fixed date before the close of this Hearing what the position is, I say to you now that we can not say that with any degree of finality because all these things are being explored and developed with a view to minimizing cost, whether it is taxes, exchange or freight or other considerations. Now, we are prepared to tell you what we are doing. You must appreciate that things of this nature are highly confidential because they influence others, but the whole of the effort that can be made is being put forth to minimize those costs by those methods because neither taxes or exchange contribute to final developments and we do not want to pay them if we can avoid them.

THE CHAIRMAN: Mr. Porter, would it be possible to give the estimated taxes on a range basis?

MR. PORTER: Yes, I think we could do that for the Board.

THE CHAIRMAN: If the plant is constructed here, if I understand you correctly, there will be a possibility of no sales tax at all?

MR. PORTER: There will be some saving in that aspect. I do not think there will be a complete avoidance, no.

THE CHAIRMAN: Would you do that, then, prepare for us a statement giving us the range of the

possibility of the tax picture?

MR. PORTER: Yes, sir.

THE CHAIRMAN: Dependent upon the various factors?

MR. PORTER: Yes. Down to any we do not see how we can avoid, certainly we will give you that. We are sufficiently confident in our ability to do it within those figures. The market figures which you will hear are premised on this being accomplished.

THE CHAIRMAN: Regardless of the tax picture, you think it can be built for this?

MR. PORTER: That is our view, but we would like to save the taxes.

DR. GOVIER: Mr. Waterfield can save a little money by spreading out those compressors.

MR. PORTER: Yes, I thought he was being rather generous to the compressor people.

THE CHAIRMAN: Thanks, Mr. Waterfield.

MR. PORTER: I would like now to call, Mr. Chairman, Mr. Ranson. Mr. Ranson will testify as to the transportation cost, and it seems to me that follows logi ly after Mr. Waterfield.

SUBMISSION "ESTIMATED TRANSPORTATION COSTS" BY R. A. RANSON PUT IN AND MARKED EXHIBIT 56.

R. A. RANSON, having been first duly sworn, examined by Mr. Porter, testified as follows:

Q Well, Mr. Ranson, will you tell us about yourself so that we will know why we should pay some attention to your opinions?

A I will review my professional experience, which has been very largely in the natural gas business. I am a graduate of the College of Engineering, Carnegie Institute of Technology, Class of 1928. Thereafter I was in Denver, Colorado, with Public Services Company of Colorado for one year as a junior engineer in public utility work. That company had gas, electric, street railway, steam heat, public utility services. I spent quite a bit of that time in both gas and electric work.

Following that I had five years in the Petroleum Division of City Service Company, principally in their New York office, concerned with natural gas, natural gasoline and petroleum work. That work was very largely natural gas pipelines, production, distribution work.

Following that approximately one year in Washington with the Securities and Exchange Commission, and that was from November 1935 through September 1936, and that was the time they were setting up the administration of the Public Utility Holding Company Act, and I was concerned with the administration of that Act.

Then six years with Panhandle Eastern Pipeline Company as an engineer, and during

approximately fourteen months at that time I was a director of Panhandle Eastern Pipeline Company. That brings us down to --

Q That company handles natural gas?

A Panhandle Eastern Pipeline Company is a very large natural gas company having a line from the Texas Panhandle in the Hugeton field to Michigan, Ohio, Indiana and Illinois, and the largest single city served is Detroit.

That brings us to the latter part of 1942, and following that there were four years of military service in research and development service in the Ordinance Corps of the Army, that ending in June 1946. From that time until the present time I have been engaged as an independent consulting engineer.

During the period following military service as a consulting engineer, and during a large part of my previous work I have had occasion to make economic studies of pipelines, to study their operating costs, to do rate design work, and design work on pipelines, distribution systems, and do work on operating problems as a matter of improving efficiencies and lowering costs, things of that sort. I believe that is a very brief summary of my twenty-three years of experience.

Q Now, you have a brief, Mr. Ranson.

THE CHAIRMAN: I would like to clear something in my own mind. Did I understand Mr. Ranson to say he was an independent consulting engineer? I notice this is by H.K. Ferguson Company Limited.

Q MR. PORTER: Perhaps you should explain

who H.K. Ferguson is?

A I was retained by H.K. Ferguson. H.K. Ferguson had been employed by Trans-Canada.

Q And who are H.K. Ferguson? What is their business?

A H.K. Ferguson Company is an engineering firm, which firm had been retained by Canadian Delhi Oil Limited for the purpose of preparing certain studies having to do with markets for natural gas and economic studies of the proposed pipeline, things of that nature, one of which was this estimated transportation costs for the proposed system.

Q And you were retained for that aspect?

A That is right.

Q Now, I think you may proceed to your brief.

A This statement entitled "Estimated Transportation Costs" for Trans-Canada Pipe Lines Limited is for the third year and has been divided between gathering and transmission transportation costs.

Q By the way, why did you pick the third year instead of, as was done, I think, yesterday, by one of the parties, an average of five?

A Instead of presenting an average over a period we picked a year which was very close to the average of the first five years and it turned out that that was the third year, so the third year was studied as what might be termed a typical or a year which represented the average of the first five years. Now, I will just go ahead and read this.

Q Yes, just go ahead and read.

A It is estimated that the average transportation

cost per Mcf. sold in the third full year of operation by Trans-Canada Pipe Lines Limited will amount to 38.62¢. This represents the average cost per Mcf. sold for transportation from a central point in each gas field in Alberta to points of delivery to customers. The gathering costs which are those related to the system which extends from each gas field in Alberta to the inlet of Compressor Station No. 1 at Princess amount to 5.06¢ per Mcf., while the transmission costs from the inlet at Compressor Station No. 1 to points of delivery to customers amount to 33.56¢ per Mcf. Details of the estimated costs and the division of total cost between gathering and transmission are shown in the statement attached hereto.

The assumptions and considerations represented in the estimates of cost and their division between functions are discussed in the paragraphs below.

Cost of Gas

Gas used and gas lost and unaccounted for has been charged into expenses at 10¢ per Mcf.

Q Any particular reason for taking 10¢?

A Oh, that was just a figure used for the purpose of determining total transportation costs and to an extent it represents a judgment as to the price that the actual cost may approximate.

Q Would its fluctuation upwards or downwards be significant?

A No. It is not a large figure. By reference to the table you will see that the total of this cost of gas is $621,000 and a change of 1¢ would be 10% of that, or

$62,000, which would affect my over-all transportation cost by, I believe, 6/100 of a cent, so it is a rather unimportant figure whether you pick 10 cents or 5 cents or what you select there.

Q All right, sir.

A The principal use for gas in the system operation is for compressor station fuel. The gathering system was charged with the fuel required in its one compressor station, the remainder being charged to transmission compressor stations.

The total lost and unaccounted for gas was estimated to be 1% of gas sold. The cost of this gas was allocated between gathering and transmission based on the relative inch-miles of pipe in the two systems.

System Operation and Maintenance.

Operation of mains has been estimated from a study of the organization required to coordinate and control operations of the system. Most of these operating cost items were divided between gathering and transmission on the basis of the relative miles of pipe line in the two systems.

Operation of compressor stations, exclusive of gas used for fuel, has been estimated at $12 per horsepower year for 100% load factor operation. It is estimated that, with the third year sales load factor of 86%, the compressor station operating expense would amount to $9.96 per horsepower year.

Q Now, if I may interrupt. In this paragraph you have made an estimate. Is that a judgment figure or is that a figure

drawn from some experience table?

A That is drawn from a study of costs actually incurred by large pipeline companies in the United States. It is taken from the companies' annual reports to the Federal Power Commission which shows the actual expenses over a year as well as the horsepower of the station, and from a study of that experience, which is for, I believe, ten companies, having approximately 120 compressor stations, represents a large part of the natural gas pipeline industry from the standpoint of total horsepower involved.

Q Based on the record of their experience recorded with the Federal Power Commission you have come up with this estimate?

A That is right.

Q All right, sir.

A Division of this cost item between gathering and transmission has been based on installed horsepower.

Operation of measuring and regulating stations has been estimated at $176,300 for approximately 180 stations. In making this estimate the meters were classified into size groups and an estimated annual expense for each size group applied to the number of meters in the group in order to obtain the total estimated expense. Since all such stations are on the transmission system, all of this cost was charged to transmission.

Maintenance of mains was estimated to amount to 0.75% of the investment in mains by the 5th year and the third-year maintenance to be 60% of the 5th year figure, or only 0.45% of investment in mains.

Q Now, that is another estimate. Was that based on the

examination of the same type as the compression operation?

A Yes. I made a study of one company to determine the rate of build-up of maintenance in the early years of the company to see what the third year maintenance might be, and based on a study of that performance I arrived at this figure.

Q And you have had some experience, have you, I suppose, in your Panhandle days with just this sort of thing?

A Yes, we did. At that time we were expanding the system and building additional lines and we could observe at first hand the additional maintenance and expenditures brought on by the construction of new mains, and I believe that it appears rather evident to most everyone that the older the main gets the higher the maintenance costs become, and in the first years it will be quite low and will build up gradually to a higher stable figure.

Q All right, sir.

A The division between gathering and transmission was based on relative inch-miles of pipe in the two systems.

Compressor station maintenance was estimated at $3.00 per year per required horsepower. And again I might mention that remarks made earlier as to studies on actual operating expenses of compressor stations apply to this figure of $3.00 per year for maintenance of the compressor stations. Division between gathering and transmission was based on horsepower required in the two systems.

Maintenance of measuring and regulating stations in the third year was estimated at approximately 2.5% of the estimated cost of these facilities. All of these stations are on the transmission system so all of this

cost was charged to transmission.

Supervision and engineering connected with system operation and maintenance has been estimated as a per cent of direct expenditures, 10% in the case of operation expenditures and 15% for the maintenance expenditures. Studies of actual costs reported by pipeline companies representing about 70% of the pipelines operated by natural gas companies in the United States were used as the basis for these figures.

Customers Accounting and Collecting Expenses

It was estimated that 100 of the larger accounts would cost an average of $500 per year to handle, while the 80 smaller accounts would cost an average of $100 per year each, which results in an annual expense of $58,000 all of which was charged against transmission costs.

(Go to page 1768)

Q Yes?

A Sales Promotion Expense

The annual expense for sales promotion the third year has been estimated at $50,000.00, all of which is charged against transmission cost.

Q By the way, in that respect is that higher or lower than the figure that you would expect to find in the first and second years?

A This third year cost is lower than you would expect to find in the first and second years. This company has a valuable sales job for the first two years, and I believe the expenditures would be somewhat higher in the first and second years. The first year might be $75,000.00 instead of $50,000.00, but after the business is going on the $50,000.00 item should be adequate for the sales work required, which is principally concerned with co-operation with the distributors and the direct selling of gas to industrial consumers.

Administration and General Expenses

The estimate for this group of expenses is based on costs incurred by other natural gas companies of approximately the same size and character. The division between gathering and transmission is based on relative plant accounts for the two systems.

Q Well, now, I would like you to explain to the Board what you mean by "Administration and General Expenses", what is in it, or what yardstick you use, or what check you have on it?

A Administrative and general expenses is the title applied

to a great deal of or a group of accounts having to do with what in the general business world might be called overhead, but generally relates . . .

Q That is what some accountants call it when referring to lawyers' unproductive labour?

A I have heard that. I might say it includes legal services as well as other matters.

Q All right, I am beginning to understand it.

A It includes salary paid for general officers and executives, and all the personnel in the general office, as well as their expenses. It would include any management fees or special services, such as auditors, directors' fees, office rent, injuries and damages, insurance, employees' welfare expenses and pensions, and items of that character.

MR. C. E. SMITH: No entertainment mentioned there?

A That frequently in hidden in the expense of general officers, and I think it would be included if it is paid by the company. I approached this from two ways. One was to form my own opinion as to what it will cost this company for all these items. I have estimates for each of the items based upon my experience with companies of this size and have obtained a figure, and I then relied upon statistical study of a number of companies, using a method which the Federal Power Commission has used in one of its publications of taking the revenue and subtracting from that the cost of gas purchased. Now, revenue less cost of gas, if there is a fair return being made, is essentially transportation costs, so that it amounts to relating it to transportation costs in total, and I have used that method,

and I will point out what that percentage represents for two companies, which I consider to be quite comparable to this project, for the year 1950. The figure for the Tennessee Gas Transmission Company was 6.01, and for the Texas Eastern Transmission Corporation, it was 6.18 per cent in total.

Q MR. PORTER: And what is yours?

A These calculations have been based on 6 per cent, and that gives a figure of$2,300,000.00 for the third year for this company. The figure which I obtained prior to that by estimating each of the expense items in detail came up to $2,200,000.00, so that I consider it was a pretty good check as to what the total might be. I use the higher figure of $2,300,000.00.

Q All right, sir, what is the next item?

A <u>General Taxes</u>

This item is intended to cover ad valorem taxes as well as general taxes such as those levied on payrolls for unemployment, pension and general welfare purposes. The amount allocated to gathering cost does not include any allowance for ad valorem taxes since it was assumed that the pipe lines would not be subject to the ad valorem tax in Alberta.

That intention there was not to be subject to the Provincial ad valorem tax in Alberta.

<u>Depreciation</u>

Depreciation has been calculated on a straight line basis for the plant installed each year at rates to

produce a complete amortization of all plant by the end of the twenty-fifth year. Allocation of the total between gathering and transmission was based on relative plant accounts of the two systems.

Income Taxes

Q Before you leave that item of depreciation, someone may ask you, and I might as well do it. Why do you take 25 years?

A That was a judgment figure. That is the 25 years based upon a general examination of the testimony as to gas reserves and deliverability.

Q I see. It fits the deliverability study?

A Yes, it does.

Q I see.

A Now, with regard to Income Taxes.

A composite rate of 51.1% was used in computing the total of Dominion and Provincial income taxes. That is a statement which I think perhaps could do with a little explanation as to . . .

Q . . . as to how you arrive at 51.1?

A The current Dominion Income Tax rate, as I am informed, is 45-6/10% and in the Provinces west of Ontario the rate for Provincial Income Tax is taken at 5%, while for the Province of Ontario and the Province of Quebec it is taken at 7%. The average over-all is taken at 5½%, so that the total of 5½% for Provincial taxes plus the 45.6 for Dominion taxes results in this total of 51.1%.

Q THE CHAIRMAN: Isn't there another 2% on there for old age pensions?

MR. PORTER: I beg your pardon?

THE CHAIRMAN: Isn't there another 2% on there for old age pensions?

MR. PORTER: Well, I am not sure what it is for but it is on anyway.

THE CHAIRMAN: I think there is another 2%.

MR. C. E. SMITH: We are all liable to use it here if we keep going.

MR. PORTER: I think my learned friend is optimistic if he assumes that there will be many survivors reach 70.

MR. MILVAIN: It might not last that long.

THE CHAIRMAN: I understand that there should be 2% in here.

MR. PORTER: I just wanted to have the best estimate. I have no doubt it will be changed again upwards, before we get very with these proceedings.

A It was assumed that interest charges in the amount of $7,600,000 would be applicable to the third year of operation and that the Utility Income, or Return, would amount to $16,100,000.

Those are figures which you need in order to calculate the facts.

The division of income taxes between gathering and transmission was based on the relative plant accounts of the two systems.

Return

The total return of $16,100,000 for the third year of operation represents 7% on $230,000,000, the

estimated system rate base for that year. Division of this cost between gathering and transmission was based on relative plant accounts of the two systems.

Volume of Sales

Sales volume for the third year of operation has been estimated to be 108,700,000 Mcf. This volume was divided into the total costs to obtain the unit transportation costs shown as "Average Cost per Mcf Sold."

The tabulation following the text sets forth the results of the calculation and, I believe, is self explanatory.

Trans-Canada Pipe Lines Limited
ESTIMATED TRANSPORTATION COSTS FOR THIRD YEAR
DIVIDED BETWEEN GATHERING AND TRANSMISSION

	Thousands of Dollars		
	Gathering	Trans-mission	Total
Cost of Gas			
For Fuel and Other Uses	$ 8	504	512
Lost & Unaccounted for	18	91	109
Total	26	595	621
System Operation			
Mains	118	207	325
Pumping Stations	13	937	950
Measuring & Regulating Stations	--	176	176
Maps & Records	5	10	15
Supervision & Engineering	14	133	147
Total	150	1,463	1,613
System Maintenance			
Mains	143	745	$ 888
Pumping Stations	4	231	235
Measuring & Regulating Stations	--	25	25
Supervision & Engineering	22	150	172
Total	169	1,151	1,320

R. A. Ranson,
Dir. Ex. by Mr. Porter.
Cr. Ex. by Mr. Nolan.

Table cont'd.

Customers Accounting & Collecting	--	58	58
Sales Promotion	--	50	50
Administrative & General	314	1,986	2,300
Total Operating Expenses	659	5,303	5,962
General Taxes	20	780	800
Depreciation and Amortization	1,397	8,819	10,216
Income Taxes	1,217	7,683	8,900
Return	2,201	13,899	16,100
Total	5,494	36,484	41,978
Average Cost per Mcf Sold	5.06¢	33.56¢	38.62¢

Q Thank you.

MR. NOLAN: I would like to ask Mr. Ranson a question or two, if I may, Mr. Chairman.

THE CHAIRMAN: Yes.

CROSS-EXAMINATION BY MR. NOLAN:

Q Mr. Ranson, would you be good enough to look at that table which you have just made reference to, and you have an item there "Depreciation and Amortization", and in the body of your text you say, "Depreciation has been calculated on a straight line basis for the plant installed each year at rates to produce a complete amortization of all plant by the end of the twenty-fifth year." I noticed in some other submissions that the rate of depreciation is set out. You have not given us the percentage of depreciation. You say "at rates which will amortize the whole plant at the end of the twenty-fifth year." Could you expand that a little, Mr. Ranson?

A Well, I took the plant account and service at the end of

what you might call the second construction year. It is contemplated that there will be some sales prior to the first full year of operation.

Q Yes?

A And that plant account would be divided over 26 years, and that is a charge against the expense of 1/26th of that amount each year.

Q Yes?

A Now, the amount added and in service during the following year would be divided by 25, that is, 1/25th would be charged against expenses for all years commencing with the first full operating year. The additions made during the second operating year would be divided by 24, so that there would be a charge of 1/24th of that for all years after the first full operating year.

Q What is the depreciation based upon?

A It is based upon cost.

Q That is, capital cost plus working capital?

A No, I wouldn't put working capital in depreciation.

Q Just capital cost?

A It is the cost of property, that depreciation.

Q I notice also, Mr. Ranson, that you have spoken on page 2 about the cost of operation of compressor stations and I was not too clear about that paragraph, and I thought perhaps you could help me with it. I understand when you have a 100% load factor the cost of operation has been estimated at $12.00 per horsepower, and then you say:

"It is estimated that, with the third year sales load factor of 86%, the compressor station operating

"expense would amount to $9.95 per horsepower year."

I wondered about that, Mr. Ranson, what goes into it? What are the main items charged into this operating costs of the compressor stations?

A The largest item is labour.

Q And would it be fair to say that this cost would be more or less constant over the range of operation between 86% and 100% load factor?

A I do not believe it would.

Q You do not believe it would?

A I do not think that is a fair statement, no.

Q You think there would be a variation?

A Yes. I believe that actual experience has shown that as the load factor becomes less than 100% the number of hours that the engines operate decreases, the number of engines that it is necessary to operate decreases, and the labour cost charged to operating expense would decrease.

Q And is that why your unit cost goes down from $12.00 to $9.95?

A That is a part of it.

Q When your load factor goes down from 100 to 86?

A Yes, sir.

Q I would have thought it would have gone up with a smaller load factor, but I am wrong about that, am I?

A Perhaps the cost per Mcf of gas is up. I have not figured that. The cost per horsepower per year would go down.

Q Because of the lesser use of the plant and the less labour involved in the use?

A If the plant stood idle and did not operate you would not

need the operators there, which is carrying it to the extreme of zero.

Q Now, you told us, Mr. Ranson, that one time in your professional career you have been connected with the Panhandle Company?

A That is right.

Q And that was a large pipe line and gas transmission company?

A Yes, sir.

Q Where do they get the gas?

A The Panhandle Eastern Pipe Line?

Q Yes, the Panhandle Eastern Pipe Line?

A The principal supply prior to October of this year was from the Texas Panhandle field and from the Hugoton field in Kansas, Oklahoma and Texas.

Q It got its name from the Texas Panhandle field? I suppose it did, it doesn't matter.

A That is my impression. I had nothing to do with naming it, though.

Q Yes, and what is the ultimate destination of this gas, is it Detroit, and Windsor in Canada?

A I gave the names of the States and I did omit Canada. I am sorry. A very small part of the gas does cross the river at Detroit and go into southwest Ontario.

Q Well, I was not making any particular point about that, Mr. Ranson. Is it the same price in Windsor as it is in Detroit?

A I do not know about the price in Windsor. Are you asking me what Panhandle Eastern sells the gas for?

Q Yes?

MR. PORTER: Just a moment. Is this examination as to this man's credit? Is my learned friend examining to prove he is not worthy of belief? Because if he is only examining on that, then it is completely irrelevant to the testimony this man was called to give and the assistance he is contributing to the Board. He might have been working for a steamboat company, and it might be with regard to bananas in Africa.

MR. NOLAN: I should be very sorry . . .

MR. PORTER: I suggest that there should be some measure or relevancy.

MR. NOLAN: I should be very sorry to be the first to adduce irrelevant evidence before this Board. But the fact remains, and I am not, of course, attempting in any way to impeach the credibility of this gentleman, but he did give us some prices of gas as the average cost per Mcf sold in his tabulation which I have before me, so much for gathering, so much for transmission, and a total cost of 38.62 cents, and I wondered whether it would be of assistance to the Board to compare the cost at which the Panhandle gas was sold at Detroit, for example, being its destination, and that is the only purpose I wish to serve. Perhaps Mr. Ranson knows, perhaps he does not know.

Q Do you know, Mr. Ranson?

A I do not know.

Q Do you know what is the cost of transportation of that gas from Texas to its destination?

A No, sir.

Q And do you know whether on the basis of these figures which

have been set out as the cost of gas sold per Mcf there have been any indications of any willingness on the part of anybody to buy gas from your company at those prices?

A No, sir.

(Go to page 1780.)

Q That does not lie within your province?

A That is not a problem in calculating transportation costs.

Q No, but it is a problem of getting rid of the gas after you get it down there?

A There is another man taking care of that. He gave me the sales figure and I am relying on that.

Q You, perhaps, do not know the cost of transporting gas now from Texas through the Panhandle system to Detroit and Windsor. What was the cost of transportation when you were with that company?

A I am trying to remember what the price charged at Detroit was and I am afraid I can not remember. We had a demand charge and a commodity charge and a special rate on house-heating. It was a very involved thing. I can not remember now what the rate was.

Q You can not tell me the average cost?

A I can say that at that time it was slightly under 30 cents. The figure that is in my mind now is somewhere between 28 and 30 cents.

Q How long ago is that?

A About 1940.

Q Well, now, that price of 28 to 30 cents, is that the price at which gas was sold to the distributor?

A At that time.

Q Well, can you give me the figure from your memory of the transportation cost of that gas sold at that figure?

A No, I can not remember those figures.

Q Well, let us come back to the Panhandle and the Hugeton field. Do you know what this Panhandle Eastern Company

paid for the gas? What was the field price?

A There were many field prices there and the company produced a very large part of its own gas. I believe there were prices ranging from 4 cents per Mcf. up to 6 cents per Mcf., and I am not positive that 6 cents was the upper figure. There may have been one contract just a little over 6 cents, I am not sure now.

Q It would be somewhere in that approximate range?

A Yes.

Q I suppose to get at the transportation cost you can subtract the field price from the price at which the distributor buys the gas. Was it as simple as that?

A A figure which would be related to a pipeline which was built commencing some time in the year 1929 and had some additions on it since that time and had a length from the field to Detroit of slightly over 1700 miles, I believe, and from 1929 to the present time would have 20 years of depreciation on the plant account which had been put in originally, and a number of other special factors would be required in order to describe just the meaning of that figure, but that is what you have once you obtain it, yes, sir.

Q Well, now, just what do you mean? Would you get your transportation cost by subtracting your field price from your distributors' price?

A I was simply trying to point out to you that the value of the figure after you have got it, its significance would be related only to Panhandle Eastern Pipeline Company.

Q Oh, I quite agree.

A That is all I wish to point out.

Q Yes, that is all I wanted to know.

A Yes.

CROSS-EXAMINATION BY MR. MARTLAND:

Q Mr. Ranson, when you were referring to the paragraph, page 2, which had to do with the estimates for operation of compressor stations, I think you told Mr. Porter that you had obtained the figures with reference to some report of the Federal Power Commission, was it, or reports to the Federal Power Commission?

A Reports to the Federal Power Commission.

Q Can you tell me what year you are referring to?

A For the year 1948.

Q There has been a change upwards since that, hasn't there, Mr. Ranson?

A I believe there is, yes, sir.

Q But your computations were made on the basis of 1948 figures?

A The basic data which I had was for the year 1948.

Q Now, if you turn to page 4, and the item of general taxes, I wonder if you could give us a little more detail as to just how you computed the figures which are shown on page 6. Did you have any particular estimated percentage in mind?

A I arrived at the $800,000 figure by applying certain assumed assessed values and tax rates in each Province for the purpose of calculating the ad valorem tax to cover the general taxes, Miscellaneous in there, I estimated the annual payroll and included 3 per cent of

annual payroll as being estimated taxes of that character, and then I have added $150,000 on top of those figures to cover omissions.

Q What percentage did you use with regard to the taxation, Mr. Ranson?

A I am sorry, I can hardly hear you.

Q What percentage did you use with regard to the taxation, a varying percentage from province to province?

A Yes, I did.

Q Would you just tell us?

A I have used a 10-mill rate in Saskatchewan, 20 mills in Manitoba, 30 mills in Ontario, and 40 mills in Quebec.

Q And applied that to what figure?

A In Saskatchewan the figure is $3,798,000, and Manitoba it is $1,821,000; in Ontario $13,639,800, and in Quebec $252,000, assessed values.

Q Now, on page 5, you refer to a rate of return on an estimated rate base of $230,000,000, and am I correct in assuming that that $230,000,000 figure is taken from this estimated plant account of Mr. Waterfield's?

A That was the beginning figure, yes, sir.

Q And you were aware, or you have heard through Mr. Waterfield's testimony, that his figure did not include anything for duties or sales taxes?

A I heard that testimony.

Q Yes. If an addition had to be made in that respect, then your figure on return would have to be increased because there would be a percentage applied to a large rate base, would it not?

A Perhaps the end answer you want is if the over-all cost should be higher than $253,000,000 then this rate base would be higher than $230,000,000.

Q That is it, isn't it?

A I think that follows.

Q And that would result in a larger figure in your statement on the return item?

A So long as the rate of return of 7 per cent is maintained at that level.

Q Yes. It would also affect your figure for income taxes?

A If the total utility return is increased and the interest charges only go up proportionate to the rate base, well, then, the income taxes would increase.

Q And it would also have a bearing on your figure for depreciation and amortization?

A Yes. If the period over which the property is amortized is the same,since you are amortizing a larger number of dollars it would increase.

CROSS-EXAMINATION BY MR. S.B. SMITH:

Q Mr. Ranson, your average cost per Mcf. sold is 38.62. Now, if you are going to find out what you are going to sell gas for at some point, you have got to add to that the cost of your gas, don't you?

A I would think so.

Q Well, there is no doubt about it, is there?

A I am not sure. If you want to know the total cost of gas delivered, what you would sell it for, that might be something else.

Q You might sell it for more. You would have to sell it for that much, in any event?

A If you are going to make this return, you would, yes, sir.

Q Now, would you expect -- let me ask you this, first. You propose to sell gas in Regina, Winnipeg, Port Arthur, Fort William, Sudbury, North Bay, all the way along the line, don't you?

A That is my understanding of it.

Q Now, would you expect a consumer of the city of Regina, if you sell to the city of Regina or the distributing system there, to pay the same price for gas as the purchasing company in Montreal, because you have carried the gas only a few hundred miles to Regina and carried it 2200 miles to Montreal. You would not expect to charge the Regina company the same price, would you?

A I do not know that this enters into this transportation cost at all.

Q I do not know whether it does or not.

A I have tried to develop a method - -

Q You have no idea what you would expect them to do?

A I have not any basis for forming a philosophy as to what I should expect them to do.

Q No, but if you are going to charge Regina the same price that you do Montreal it might be better for Regina to build its own pipeline from Alberta and then it could get cheaper gas?

A That is certainly something they should be free to do.

Q And don't you think it is logical and reasonable to expect, having transported the gas only a few hundred miles to

Regina, you would sell it at a lower figure than you would at Montreal?

A On those facts alone I can not decide it one way or the other.

Q You won't commit yourself at all?

A No, sir.

Q Well, now, you have had a lot of experience in the gas pipeline business?

A That is just one reason I would not give an answer.

Q What is this transportation of gas? The pipe line is a carrier, isn't it, like a railway?

A No, not like a railway, the characteristics are quite different.

Q There are different characteristics, it is quite true, but do you suggest the transportation cost of gas which goes into a pipeline system is unrelated completely to the distance it is carried?

A Oh, not entirely.

Q Now, let us take the Panhandle Company. Does the Panhandle Company serve any towns, cities or villages enroute?

A Yes, it does.

Q Does it charge the same price to the communities near the Panhandle that they charge the city of Detroit?

A I am a little handicapped on that because they filed rate schedules about a month or so ago. I will tell you what happened in 1941, along in there, I can tell you about that.

Q Tell us about that, did they charge a community 100 miles from the Panhandle the same price as they charged in Detroit?

MR. PORTER: I do not know just how my

learned friend sets up an assumption and then proceeds to have fun about it. Now, as I said, certainly this witness has not said that he is going to charge anybody in Regina the same price as somebody in Winnipeg, he says he doesn't know what the price is going to be. He has given us an average transportation cost on a physical job of conveying gas. I can not quite see that my learned friend is entitled to make an assumption because this witness says he does not know, therefore it seems to be an assumption that there is a common price for gas along this line - -

MR. S.B. SMITH: May I proceed, sir.

Q Well, let us put it this way. We will make some more assumptions, Mr. Ranson. If you charge the same price in Regina that you do in Montreal, then the Regina consumer is helping to carry the gas to Montreal, isn't he?

A I am not sure which comes first there. I think the Montreal consumer is making it possible for Regina to have gas at all.

Q At a price?

A Yes, as against not having it at all.

Q It is that price you do not want to tell us about. Now, tell me this, if you sell the gas to the company in Regina for less than you sell it in Montreal, then you have got to charge the Montreal company more than 38.62 plus the cost of the gas to make up for the smaller amounts you did not collect from the Regina company, haven't you?

A I believe it is true you have an average of two numbers and the two numbers are not equal.

Q That seems pretty obvious?

A You have one smaller than the average and one higher than

the average.

Q Let us assume you are going to sell gas in Regina for 35 cents, it might be out one way or the other, I do not know. Then the average cost of the gas delivered to Montreal is going to be higher than 38.62 plus the cost of the gas, isn't it?

A I would think so; that would follow.

Q The customer in Eastern Canada is going to be affected by the selling price of every bit of gas that you sell en route if you sell it at less than the Montreal price?

A I would think so.

Q MR. PORTER: And the effect will be in direct proportion to the quantity of gas dropped off to the total quantity handled?

A Yes, sir.

Q And we are contemplating 1.8 million for Regina out of 365 million a day. Have you a pen-point fine enough to do that arithmetic?

A I believe you would have to use the 346 million figure.

Q Aren't you going to charge Regina with any waste?

A It is a very small factor on the overhead verage rate.

Q MR. S.B. SMITH: Just this small, it is the total of whatever you will sell en route and your average is 300 million per day, isn't it? That is the figure you have used?

A Roughly 86 per cent of the 346 million.

Q Haven't you used 108 billion per year?

A 108.7, I believe.

Q So that is about 300 million a day?

A Whatever you obtain by dividing 365 into that number.

Q That is approximately the division. You could alter the proposed consumption in Sudbury, Winnipeg, Regina and all those other places. You have not got those figures.

MR. McDONALD: No questions, sir.

MR. MILVAIN: I see it is 4 minutes to 1. It might be better if I cross-examined Mr. Ranson tomorrow morning.

MR. C.E. SMITH: Before we adjourn, I wonder if you can announce the matter of time so we won't get mixed up again.

MR. MILVAIN: I do not think I will be long with Mr. Ranson, maybe 15 or 20 minutes.

MR. C.E. SMITH: I am talking about the adjournment.

THE CHAIRMAN: We will sit tomorrow from 9:30 until 12:30, and 2 to 4.

(The Hearing then adjourned until 9:30 A.M., Thursday, November 15th, 1951.)

The Province of Alberta

PETROLEUM AND NATURAL GAS CONSERVATION BOARD

Application for Permission to Remove or cause to be removed Natural Gas from the Province of Alberta, under the Provisions of the Gas Resources Preservation Act by Western Pipe Lines.

I. N. McKinnon Esq., Chairman

D. P. Goodall Esq.

Dr. G. W. Govier

Session:

Volume_____